BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images,
Please do not report the images to the
Image Problem Mailbox.

(12) UK Patent Application (19) GB (11) 2 239 845 (13) A

(43) Date of A publication 17.07.1991

(21) Application No 9027365.7

(22) Date of filing 18.12.1990

(30) Priority data
(31) 3942043 (32) 20.12.1989 (33) DE

(51) INT CL[5]
B60C 11/03

(52) UK CL (Edition K)
B7C CDJ

(56) Documents cited
GB 2224472 A GB 2166095 A EP 0172974 A1
US 4726407 A

(58) Field of search
UK CL (Edition K) B7C CCJ CDJ
INT CL[5] B60C

(71) Applicant
Uniroyal Englebert Reifen GmbH

(Incorporated in the Federal Republic of Germany)

Postfach 410, Hüttenstrasse 7, 5100 Aachen 1,
Federal Republic of Germany

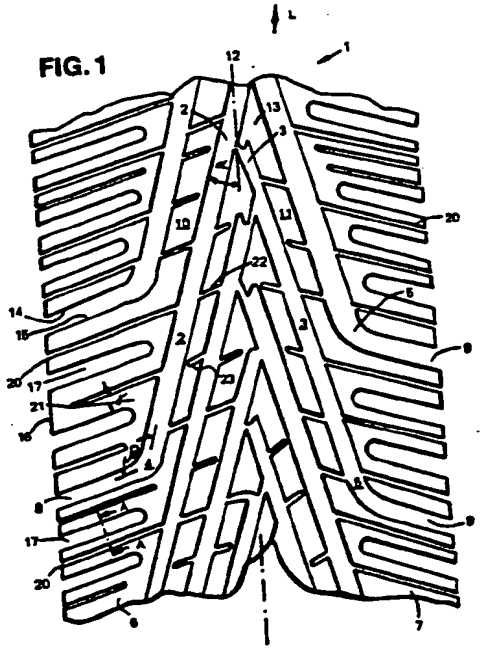
(72) Inventor
Wolfgang Kuhr

(74) Agent and/or Address for Service
Potts Kerr and Co
15 Hamilton Square, Birkenhead, Merseyside, L41 6BR,
United Kingdom

(54) A pneumatic vehicle tyre tread pattern

(57) A tyre tread comprises rib elements 10, 11 separated by grooves 2, 3 extending parallel thereto and forming a V-shaped pattern the apices of which are directed circumferentially of the tyre, the groove starting points being offset relative to one another in the circumferential direction and the grooves undergoing a directional change in the region 4, 5 of the boundary between the central region and the shoulder region of the tyre. The angle ß is from 95° to 135°. Incisions 20-23 of widths from 0.45 mm to 2.5 mm are provided in the shoulder blocks 16 and the elements 10,11.

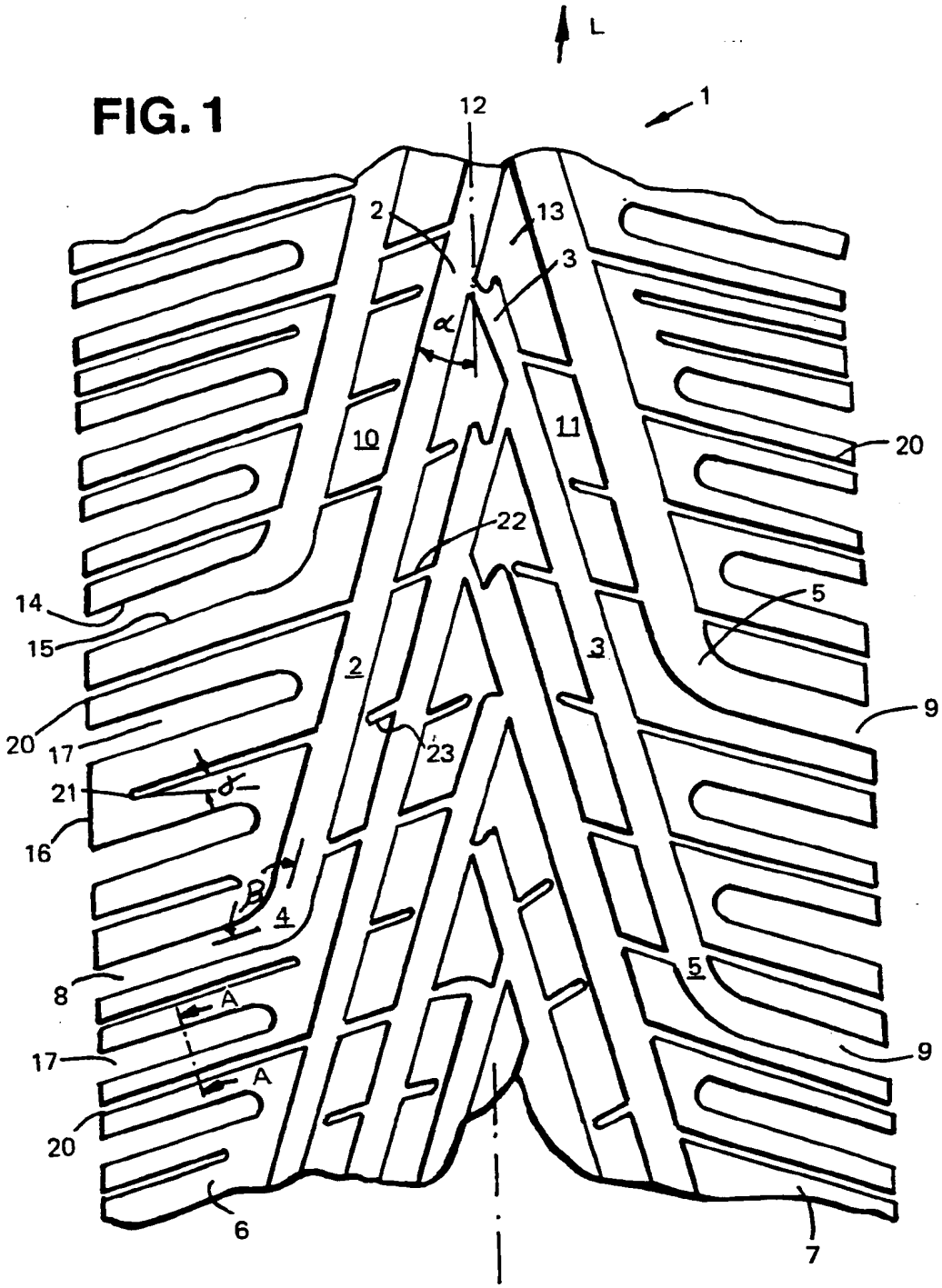
FIG. 1



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

GB 2 239 845 A

FIG. 1


L
1
12
2
13
3
α
10
11
20
22
14
15
5
3
2
9
20
17
23
21
γ
16
β
4
5
8
A
9
17
A
20
6
7


20
17
40
36

FIG. 3

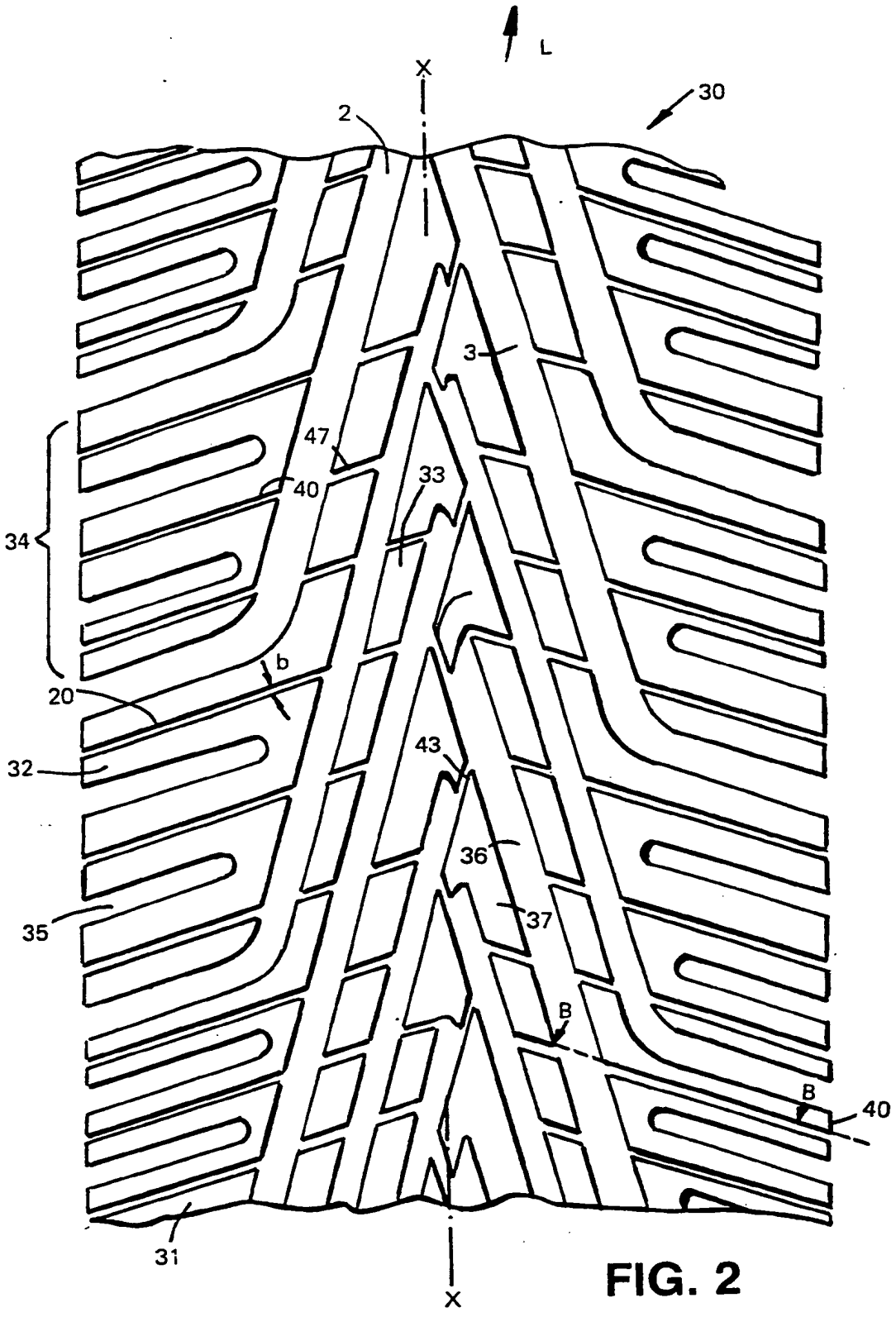


FIG. 2

A PNEUMATIC VEHICLE TYRE

The invention relates to a pneumatic vehicle tyre of a radial carcase construction, having a tread surface profile, which is adapted to the direction of rotation and includes a pluraiity of inclinedly orientated rib profile elements, which extend at an acute angle relative to the centre line x-x of the tyre circumference, and profile grooves, which extend substantially parallel thereto, with angular portions in the shoulder region. In this tread surface profile, the rib profile elements and the profile grooves of one tread surface half extend in the opposite direction to those of the other tread surface half and, in this respect, are provided in a V-shaped configuration. The profile groove commences in the region of the centre line of the tyre circumference and is disposed at a very steep angle at an angle of inclined orientation α relative to this centre line. The rib profile elements are interconnected by means of profile element bridge portions in the region of the centre line of the tyre circumference. In addition, the starting points for the profile grooves are disposed so as to be offset relative to one another in the circumferential direction. The angular portion of the profile groove is situated at the boundary between the central region of the tread surface and the shoulder region of the tread surface. In consequence, the shoulder profile grooves extend in an angular manner at an angle of 95° to 135°, measured relative to the respective centre of the profile groove, and terminate in open manner in the tyre shoulder.

In such pneumatic vehicle tyre, this arrangement improves the drainage, whilst at the same time a relatively small emission of sound is achieved.

If such pneumatic vehicle tyres are formed as wide tyres with a height: width ratio which is ≤ 0.6, then, according to the object of the invention, an improvement in the resistance to sliding in the wet is to be achieved, without the resistance to sliding being adversely affected in dry conditions, and without the absorption of lateral forces and the resistance to skidding when travelling over rails being adversely affected when, according to the invention, at least some of the profile elements have at least partial transverse incisions of about 0.45 mm to 2.5 mm, which extend substantially parallel to the profile elements or grooves of the shoulder region and are disposed in a V-shaped manner when viewed over the entire width of the tread surface.

In the case where pneumatic vehicle tyres have a relatively large width, problems may occur during braking at high vehicle speeds when there are relatively small layers of water or films of water, or when there are layers of dust and water mixtures, which are frequently encountered, at least on road surfaces which are not rough. In order to provide the pneumatic vehicle tyre with the required resistance to sliding in the wet for such circumstances, the profile elements, which are disposed in an elongated and V-shaped manner, are provided with the numerous, above-mentioned traverse incisions, so that a plurality of radial edges can become effective thereby. The transverse incisions may be partially and additionally provided with partial or full cross-sections. Because of the additional radial edges now provided, any wet location or layer of water in the ground supporting area, which results in reduced adhesion to the ground, is split-up or divided in many ways.

Furthermore, the provision of the transverse incisions causes the transition region between the shoulder profile and the rib element to be more flexible. The additional radial edges now provided for the transverse incisions and the greater flexibility of the profile elements, more especially in the shoulder region, are suitable means for improving the resistance to sliding in wet conditions. These means also cause higher peaks of the tyre noise to be reduced, so that a noise level is achieved which is lower than is produced heretofore. Because the transverse incisions in the two tread surface halves extend in opposite directions, a further means for dividing the tread surface profile is now also provided to form the arrow-like disposition, which is provided by the profile elements and the profile grooves, the arrow-like configuration of the transverse incisions supporting the arrow-like disposition of the profile elements and profile grooves which are still predominant.

The transverse incisions may have various lengths. For example, they may have a length corresponding to two-thirds of the width of the shoulder profile, or respectively of the rib profile. However, they may also extend fully transversely in each of said profile elements. They may have various widths and/or various depths, at least in different regions. That is to say that, depending upon the construction of the wide tyre, they may be wider or narrower in the shoulder region than the transverse incisions in the central region.

In particular, the depth of the transverse incisions is smaller than the normal profile depth and is preferably about half the profile depth. This

depends on the size of the tyre and, more especially, on the width of the tyre.

In addition, each profile element bridge portion, in which the profile elements of the tread surface profile meet, such elements being disposed in an arrow-like manner, is divided-up in the central region of the profile by means of an additional transverse incision, which extends in the direction of the extended profile groove. This arrangement provides a matching splitting-up of the tread surface profile in the central region of the tread surface.

The present invention will be further illustrated, by way of example, with reference to the accompanying drawings, in which:

Fig. 1 illustrates a tread surface profile with profile grooves, which are steeply orientated in a V-shaped manner, and shows, in part, the disposition of transverse incisions, which extend parallel to the profiling of the shoulder;

Fig. 2 illustrates a tread surface profile which is similar to that shown in Fig. 1, with transverse incisions, which are disposed in a V-shaped manner and extend over the entire widths of the tread surface halves; and

Fig. 3 is a detailed cross-sectional view through a transverse incision, taken along the line A-A of Fig. 2.

The tread surface profile 1 of Fig. 1 is provided for wide tyres having a height: width ratio H:B $\leq$ 0.6. It comprises profile grooves 2 and 3,

which are steeply disposed at an angle α relative to the centre line x-x of 12° to 45°, with groove portions 8 and 9, which are each bent from an angular portion 4 and 5 in the shoulder region 6 and 7 at a further angle β. These profile grooves are formed by profile elements 10 and 11, which are disposed in a V-shaped or arrow-like manner and meet in the central region 12, such elements being interconnected by means of profile bridge portions 13.

The tread surface profile in the shoulder regions 6 and 7 is formed from blocks 16, which are substantially produced from profile grooves, which are each adjacent to the boundary between the two groove edges 14 and 15. These blocks 16 are each split-up in a bifurcated manner by means of one or a plurality of inclined grooves 17.

The tread surface profile, formed from profile elements and profile grooves which are disposed in a relatively steep manner and have a V-shaped configuration, also includes at least partially disposed, partially longer or shorter transverse incisions 20 and 21 in each shoulder block 16 and transverse incisions 22 and 23 in the ribs of the profile elements 10 and 11. These transverse incisions substantially extend at the angle γ, which is significant for the orientation of the grooves in the profiling of the shoulder. This arrangement produces a plurality of radial edges, and the rigidity of the shoulder block 16 in the transitional region extending to the rib of the profile element is thereby reduced.

The width of the transverse incisions 20 to 23 is between 0.45 mm and 2.5 mm. They run centrally through the shoulder block and extend also through the

rib of the profile element of the tread surface profile, which element is centrally disposed in a steep manner. The transverse incisions each terminate in the diagonal groove 2 or 3 in the respective tread surface half. The width b of the transverse incisions is determined by the width of the shoulder block 16. In the case of a relatively narrow shoulder block, the width b of the transverse incision is, for example, about 0.75 to 1 mm. In a shoulder block of average width, the width is, for example, about 1.5 mm. In a relatively wide shoulder block, the width b of the transverse incision is, for example, 2.0 mm.

The depth of the transverse incisions is variable. For example, it is 0.5 to 0.8 times the conventional depth for the profile grooves. Because the stability of the profile element has to be taken into consideration, the depth of the cross-section may be relatively small in predetermined, but selectable, regions. It may slope, for example, In other regions, the full depth is to be achieved.

The tread surface profile 30 of Fig. 2 has profile elements and profile grooves, which are disposed in an arrow-like manner, as shown in Fig. 1. Here, the transverse incisions commence in the tyre shoulder 31, then extend further through the shoulder block 32 and terminate in the rib of the profile element 33. The transverse incisions are referenced 40 and 41 in the region of the tread surface half. They have a profile depth equal to half the full profile depth.

The width b of the transverse incisions depends on the dimension of the shoulder block portion 34. When the shoulder block has average dimensions,

the width of the transverse incision is, for example, 1 to 1.5 mm.

Since the transverse incisions extend in a V-shaped manner when viewed over the two tread surface halves, there is an additional arrow-like configuration at the angle γ here. It is in keeping with the steep arrow-like configuration which is provided by the profile elements and profile grooves, and it supports this latter configuration in the direction of travel L.

Narrow incisions 42 and 43 in the extension of the profile grooves 33 and 36 cause the profile regions 37 to be split-up further in the centre of the profile.

Fig. 3 is a cross-sectional view taken along the line A-A, showing that the transverse incisions are relatively narrow and are only provided with half the height of the profile.

CLAIMS

1. A pneumatic vehicle tyre of a radial carcase construction, having a tread surface profile, which is adapted to the direction of rotation and includes a plurality of inclinedly orientated rib profile elements, which extend at an acute angle relative to the centre line x-x of the tyre circumference, and profile grooves, which extend substantially parallel thereto, with angular portions in the shoulder region, wherein the rib profile elements and profile grooves of one tread surface half extend in the opposite direction to those of the other tread surface half, and wherein, the profile groove commences in the region of the centre line of the tyre circumference and is disposed at an acute angle of inclined orientation α relative to this centre line, and wherein the rib profile elements are interconnected by means of profile element bridge portions in the region of the centre line of the tyre circumference, the starting points for the profile grooves being disposed so as to be offset relative to one another in the circumferential direction, and wherein the angular portion of the profile groove is situated at the boundary between the central region of the tread surface and the shoulder region of the tread surface, and the shoulder profile grooves extend in an angular manner at an angle β of 95° to 135°, measured relative to the centre of the profile groove, and terminate in open manner in the tyre shoulder, in which at least some of the profile elements have at least partial transverse incisions with an incision width in the range between 0.45 mm and 2.5 mm, which transverse incisions extend substantially parallel to the profile elements of the shoulder region and are disposed in a V-shaped manner when viewed over the width of the tread surface.

2. A pneumatic vehicle tyre as claimed in claim 1, wherein the transverse incisions have a length corresponding to two-thirds of the width of the profile elements.

3. A pneumatic vehicle tyre as claimed in claim 1, wherein the transverse incisions extend in each profile element.

4. A pneumatic vehicle tyre as claimed in claim 1, 2 or 3, wherein the transverse incisions have various widths.

5. A pneumatic vehicle tyre as claimed in any one of claims 1 to 4, wherein the transverse incisions have various depths.

6. A pneumatic vehicle tyre as claimed in claim 5, wherein there is a different depth in the transverse direction and/or in the circumferential direction.

7. A pneumatic vehicle tyre as claimed in any one of claims 1 to 6, wherein the profile elements in the central region have connecting profile element bridge portions, which are divided by means of transverse incisions, which have a width of between 0.45 mm and 2.5 mm and extend transversely relative to the transverse incisions.

8. A pneumatic vehicle tyre as claimed in any one of claims 1 to 7, wherein the transverse incisions are provided centrally in a profile element.

9. A pneumatic vehicle tyre as claimed in any one of claims 1 to 8, wherein at least some of the transverse incisions are provided eccentrically in a profile element.

10. A pneumatic vehicle tyre, substantially as hereinbefore described with reference to the accompanying drawings.

Published 1991 at The Patent Office, State House, 66/71 High Holborn, London WC1R 4TP. Further copies may be obtained from Nine Mile Point, Cwmfelinfach, Cross Keys, Newport, NP1 7HZ. Printed by Multiplex techniques ltd, St Mary Cray, Kent.